CLAIMS

We claim:

1. A method for noninvasive analysis of at least one blood component comprising the steps of:

irradiating blood in a big vein associated with an underside of a patient's tongue with radiation having at least one frequency or wavelength;

detecting a response from blood irradiated in the irradiating step;

calculating a concentration of a blood component, a value of a blood parameter or a mixture or combination thereof.

2. The method of claim 1, further comprising the step of:

displaying at least one result from the calculating step.

3. The method of claim 1, further comprising the step of:

utilizing one or a combination of techniques selected from the group consisting of reflectance technique, confocal technique, scanning confocal technique, polarization techniques, interferometry, optoacoustics, low coherence interferometry and reflectometry, techniques based on speckle measurements, fluorescence technique, Raman scattering technique, and two or multi-photon techniques

4. The method of claim 1, wherein the radiation is in a spectral range from about 200 nanometers to about 20 microns.

5. The method of claim 1, wherein the response corresponds to a concentration of hemoglobin in the blood and the radiation is in a spectral wavelengths selected from the group consisting of 548 nm, 568 nm, 587 nm, and 805 nm (the isosbestic points) and spectral ranges from about 400 nm to about 640 nm and above about 1120 nm where absorption coefficients of oxy- and deoxygenated blood are close to each other.

6. The method of claim 1, wherein the response corresponds to hematocrit.

7. The method of claim 1, wherein the response corresponds to a concentrations of hemoglobin and/or glycosylated hemoglobin, where the detection and quantitation of hemoglobin and/or glycosylated hemoglobin.

8. The method of claim 1, wherein the response corresponds to a concentration of glucose.

9. The method of claim 1, wherein the response corresponds to a concentration of cholesterol.

10. The method of claim 1, wherein the response corresponds to a concentrations of oxy-hemoglobin, deoxy-hemoglobin, and carboxy-hemoglobin.

11. The method of claim 1, wherein the response corresponds to a concentration of an exogenous substance.

12. The method of claim 1, wherein the exogenous substance is selected from the group consisting of a drug, a dye or other reporter in molecular state or a particle made of liquid, gas, or solid material including polymer, metal, semiconductor, dielectric, or a combination of liquid, gas, or solid materials, and a layered structure.

13. The method of claim 1, wherein the exogenous substance selected from the group consisting of indocyanine green and Evans blue.

14. The method of claim 1, wherein the exogenous substance that are particles with a size from about 0.1 nanometer to about 10 microns.

15. The method of claim 1, wherein the radiation is microwave radiation.

16. The method of claim 1, wherein the radiation is radiofrequency radiation.

17. The method of claim 1, wherein the radiation is ultrasound radiation.

18. The method of claim 1, wherein the radiation is low-frequency electromagnetic radiation.

19. The method of claim 1, further comprising:
using a static electric or magnetic field.

20. The method of claim 1, further comprising
using a hybrid technique for irradiation and detection.

21. The method of claim 1, wherein the radiation comprises one, two, or many wavelengths (frequencies).

22. An apparatus for noninvasive blood analysis comprising:
a probe including a tip having a radiation outlet and a response inlet, where the probe tip is adapted to be placed in proximity to or in contact with a surface of a tissue over a big vein associated with an underside of a patient's tongue;
a light generation/delivery system including a light source capable of generating at least one frequency of light, and a light conduit interconnecting the light source with the radiation outlet, where the system is adapted to deliver radiation to blood in the big vein; and
a detector/analyzer system including a detector adapted to detect a response from the irradiated blood via the response inlet and an analyzer adapted to convert the detected response into a concentration of a blood component and/or a value of a parameter of the blood.

23. An apparatus for noninvasive blood analysis comprising:
right side and left side sections adapted to engage one or more teeth on each of a right side and left side of a patient's jaw,
two transitions section extending downwardly from each of the side sections,

a middle section interposed between the two transitions sections adapted to be proximate to or in contact with an underside of a patient's tongue, where the middle section includes;

a emitter, and

a receiver,

where the emitter and the receiver are proximate or in contact with a surface of a tissue over a big vein associated with an underside of the patient's tongue;

a light generation/delivery system including a light source capable of generating at least one frequency of light, and a light conduit interconnecting the light source with the radiation outlet, where the system is adapted to deliver radiation to blood in the big vein; and

a detector/analyzer system including a detector adapted to detect a response from the irradiated blood via the response inlet and an analyzer adapted to convert the detected response into a concentration of a blood component and/or a value of a parameter of the blood.

24. The apparatus of claim 24, further comprising:

a plurality of emitters and receivers, located in pairs on a right hand side and a left side of the middle section.

25. The apparatus of claims 22, 23 or 24, further comprising:

a display adapted to display the response (raw data) or converted response (refined data)

26. The apparatus of claims 22, 23 or 24, wherein the radiation is the spectral range from about 200 nanometers to about 20 microns.

27. The apparatus of claims 22, 23 or 24, further comprises:

one or a combination of techniques selected from the group consisting of reflectance technique, confocal technique, scanning confocal technique, polarization techniques, interferometry, optoacoustics, low coherence interferometry and reflectometry, techniques based on speckle measurements, fluorescence technique, Raman scattering technique, and two or multi-photon techniques

28. The apparatus of claims 22, 23 or 24, wherein the response corresponds to a concentration of hemoglobin in the blood and the radiation is in a spectral wavelengths selected from the group consisting of 548 nm, 568 nm, 587 nm, and 805 nm (the isosbestic points) and spectral ranges from about 400 nm to about 640 nm and above about 1120 nm where absorption coefficients of oxy- and deoxygenated blood are close to each other.

29. The apparatus of claims 22, 23 or 24, wherein the response corresponds to hematocrit.

30. The apparatus of claims 22, 23 or 24, wherein the response corresponds to a concentrations of hemoglobin and/or glycosylated hemoglobin, where the detection and quantitation of hemoglobin and/or glycosylated hemoglobin.

31. The apparatus of claims 22, 23 or 24, wherein the response corresponds to a concentration of glucose.

32. The apparatus of claims 22, 23 or 24, wherein the response corresponds to a concentration of cholesterol.

33. The apparatus of claim 22, wherein the response corresponds to a concentrations of oxy-hemoglobin, deoxy-hemoglobin, and carboxy-hemoglobin.

34. The apparatus of claims 22, 23 or 24, wherein the response corresponds to a concentration of an exogenous substance.

35. The apparatus of claims 22, 23 or 24, wherein the exogenous substance is selected from the group consisting of a drug, a dye or other reporter in molecular state or a particle made of liquid, gas, or solid material including polymer, metal, semiconductor, dielectric, or a combination of liquid, gas, or solid materials, and a layered structure.

36. The apparatus of claims 22, 23 or 24, wherein the exogenous substance selected from the group consisting of indocyanine green and Evans blue.

37. The apparatus of claims 22, 23 or 24, wherein the exogenous substance that are particles with a size from about 0.1 nanometer to about 10 microns.

38. The apparatus of claims 22, 23 or 24, wherein the radiation is microwave radiation.

39. The apparatus of claims 22, 23 or 24, wherein the radiation is radiofrequency radiation.

40. The apparatus of claims 22, 23 or 24, wherein the radiation is ultrasound radiation.

41. The apparatus of claims 22, 23 or 24, wherein the radiation is low-frequency electromagnetic radiation.

42. The apparatus of claims 22, 23 or 24, further comprising:
a static electric or magnetic field.

43. The apparatus of claims 22, 23 or 24, further comprising a hybrid technique for irradiation and detection.

44. The apparatus of claims 22, 23 or 24, wherein the radiation comprises one, two, or many wavelengths (frequencies).